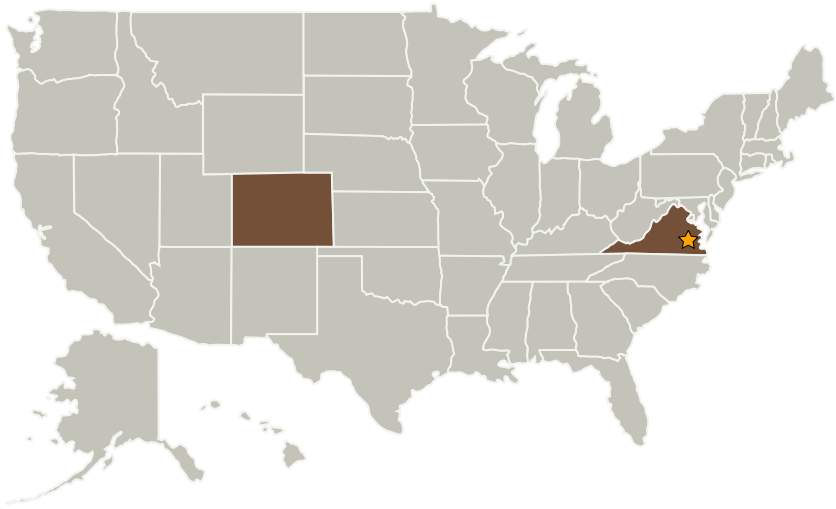
Mars Gashopper Airplane, Phase I

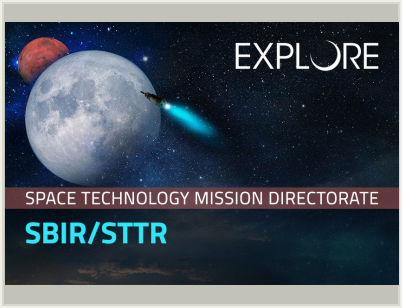
Completed Technology Project (2005 - 2005)

Project Introduction

The Mars Gas Hopper Airplane, or "gashopper" is a novel concept for propulsion of a robust Mars flight and surface exploration vehicle that utilizes indigenous CO2 propellant to enable greatly enhanced mobility. The gashopper will first retrieve CO2 gas from the Martian environment to store it in liquid form at a pressure of about 10 bar. When enough CO2 is stored to make a substantial flight to another Mars site, a hot pellet bed is heated to ~1000 K and the CO2 propellant is warmed to ~300 K to pressurize the tank to ~65 bar. A valve is then opened, allowing the liquid CO2 to pass through the hot pellet bed that heats and gasifies the CO2 for propulsion. The hot gas is piped to a set of thrusters beneath the aircraft, allowing vertical takeoff, after which the gas is shunted off to a primary rearward pointing thruster to generate forward flight speed. The hot gas system is also used for attitude control and main propulsion during landing. The advantage of the gashopper is that it provides Mars exploration with a fully controllable aerial reconnaissance vehicle that can repeatedly land and explore surface sites as well.

Primary U.S. Work Locations and Key Partners





Mars Gashopper Airplane, Phase I

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Mars Gashopper Airplane, Phase I

Completed Technology Project (2005 - 2005)

Organizations Performing Work	Role	Type	Location
★Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Pioneer Astronautics	Supporting Organization	Industry Historically Underutilized Business Zones (HUBZones)	Lakewood, Colorado

Primary U.S. Work Locations	
Colorado	Virginia

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Robert Zubrin

Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.1 In-Situ Resource Utilization
    - TX07.1.3 Resource Processing for Production of Mission Consumables